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OU#4 RI DISAPPROVAL
U.S. DOE - FERNALD
OH6 890 008 976

12-07-90

USEPA/DOE-FSO
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LETTER

[redacted]

UNITED STATES ENVIRONMENTAL PROTECTION AGENCY
REGION 5
230 SOUTH DEARBORN ST.
CHICAGO, ILLINOIS 60604

2459

DEC 07 1990

REPLY TO ATTENTION OF:

5HR-13

Mr. Andrew P. Avel
United States Department of Energy
Feed Materials Production Center
P.O. Box 398705
Cincinnati, Ohio 45239-8705

Re: OU#4 RI Disapproval
U.S. DOE Fernald
OH6 890 008 976

Dear Mr. Avel:

On August 27, 1990, the United States Department of Energy (U.S. DOE) submitted a primary draft Remedial Investigation and Risk Assessment report (RI report) for Operable Unit #4 (Silos 1, 2,3, and 4). The United States Environmental Protection Agency (U.S. EPA) disapproved this report on September 27, 1990. Accordingly, pursuant to Section XII of the 1990 Consent Agreement, U. S. DOE was required to submit a draft final primary RI report (the revised draft RI report) by October 27, 1990. On October 26, 1990, U.S. DOE requested a 20-day extension of time and submitted the revised draft RI report to U.S. EPA on November 7, 1990.

U.S. EPA has reviewed the revised draft RI report and has determined that deficiencies in the document still exist and is disapproving the revised report. The revised RI report was reviewed for completeness, technical adequacy, and compliance with the Comprehensive Environmental Response, Compensation and Liability Act (CERCLA), the National Contingency Plan (NCP), and U.S. EPA guidance. The guidance documents used include the Guidance for Conducting Remedial Investigations and Feasibility Studies Under CERCLA (OSWER Directive No. 9355.3-01), and Risk Assessment Guidance for Superfund--Volume 1, Human Health Evaluation (Part A) (EPA 540/1-89-002).

Since this is the second disapproval of this document, this letter constitutes a notice of dispute in accordance with Section XII of the Consent Agreement. The basis for U.S. EPA's determination is provided, in part, in U.S EPA's letter of December 7, 1990, to William Adams regarding a Notice of Violation for OU #4 RI. That letter and its attachments are incorporated herein by reference. In addition to the violations described in the December 7, 1990 letter, U.S. EPA has noted

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several other deficiencies in the revised RI report. These deficiencies are presented below:

1. As previously stated, the lack of key data elements essential makes this RI report unacceptable as the final document. The RI report has not provided sufficient information to define the necessary extent of remediation, or to completely support the FS. The following general comments highlight the reasons that the RI report cannot be approved as final.

   A. The report acknowledges on page ES-3 that future revisions will be required to incorporate data as it becomes available.

   B. The focus of the RI report is stated on page 1-4 as defining the vertical and lateral extent of contamination within the boundary of the OU. The RI report also states in Section 7 (Conclusions) that the nature and extent of any soil or ground-water contamination attributable to OU#4 cannot be fully evaluated until sampling, which is part of the RI work plan, is completed. The conclusions indicate that RI activities completed to date are not sufficient to meet the RI objectives stated in the report.

   C. The data collected to date is not sufficient to meet the stated RI objectives listed on pages 1-4 and 1-6. Specifically the RI report fails to provide sufficient data to do the following:

      - Characterize the source of contamination
      - Determine the nature and extent of any radiological and chemical substances in the soils, ground water, and berm materials
      - Conduct an adequate assessment of the environmental impact associated with contamination at or originating from the OU
      - Provide data necessary to perform the detailed analysis of remedial alternatives

2. The RI report does not consistently define the components of the OU. The scope of the OU#4 RI is defined differently on pages ES-2, 1-6, and in U.S. DOE's response to comments that defines the OU on page ES-3. Furthermore, the scope of the feasibility study (FS) for OU#4 is not consistently defined (pages 1-7 and 7-1) and differs from the previously defined scope of the RI. These inconsistencies should be reconciled

so that the adequacy of the data to meet the objectives can be properly evaluated.

3. Although the RI report states that underground piping, tanks directly beneath the silos, contaminated soils, and perched ground water will be incorporated into the remedial action program, it does not specify how or when this will be done.

4. U.S. DOE divides OU 4 into six distinct elements (starting on page 1-10), each having its own specific reason for inclusion in the RI.

   - Element 1 is defined as the waste materials in the silos. The RI report states that this element requires complete characterization to ensure selection of the most appropriate remedial response. Because waste material sampling in Silos 1 and 2 has not been completed, the RI report cannot meet its intended purpose.

   - Element 3 is defined as the berm materials surrounding Silos 1 and 2. The RI report states that several issues relating to evaluation of remedial alternatives for this OU must be addressed in the RI. Because sampling of berm materials has not been conducted, the RI report cannot meet its intended purpose.

   - Element 4 is defined as the glacial overburden beneath the silos. The RI report states that the presence of contamination beneath the silos would have significant impact on evaluation of remedial alternatives for OU#4. Because sampling of the glacial overburden beneath the silos has not been conducted, the RI report cannot meet its intended purpose.

5. Many of the tables indicate that data in the RI report has not been completely validated. The RI report cannot be accepted as final until all data is validated.

6. The most recent ground-water sampling analytical results are from March 1989. Several sampling rounds have been conducted since then; the results of these sample rounds would provide useful information.

7. Samples from locations downgradient of Silos 1 and 2 could have been collected and analyzed before the RI report was submitted. Specifically, ground-water samples could have been collected and analyzed for Pb-210, and archived soil samples could have been analyzed for U-238. Results from

these analyses would have helped to fill data gaps identified in the RI report.

8. No information has been presented in the Risk Assessment to allow adequate assessment of the environmental impact of the K-65 silos on the surrounding area. Although it is acknowledged in the text that the environmental impact is being addressed in the preparation of the environmental impact statement (EIS), the absence of sufficient data in this RI report to allow in-depth evaluation in this report is a significant omission. The final risk assessment must include a thorough analysis of environmental receptors.

9. Several conclusions drawn from data concerning the nature and extent of contamination are suspect. As the RI report itself states, only completion of sampling currently within the scope of the RI work plan will provide sufficient data to support conclusions.

10. The RI report states that no additional sampling of waste materials in Silo 3 is necessary because U.S. DOE feels that the waste materials are homogeneous. Statistical analysis of data from all 3 silos sampled indicates that all silos display about the same level of homogeneity. Therefore, additional information is necessary to support U.S. DOE's conclusion or additional sampling of Silo 3 may be required.

11. The discussion of remedial action objectives (RAOs) cannot be accepted as presented. Specific concentrations for each contaminant must be set, and an evaluation must be made of whether the combined risk of all RAOs for all carcinogens is within the 10^{-4} to 10^{-6} risk range and of whether the combined effect of all noncarcinogens is sufficiently protective.

12. The section discussing previous investigations must discuss the validity of data and conclusions presented in referenced reports. This is necessary because EPA may not agree with the conclusions of previous documents. The omission of a discussion on the validity of the data or conclusions may lead to an incorrect perception of site characterization. An example is the risk characterization presented in the University of Ohio Risk Assessment report in which EPA had significant comment.

13. All referenced documents should either be entered into the administrative record or at least be included in the Administrative Record Guidance Index.

14. For U.S. EPA's comments #1 and 60, U.S. DOE continues to fail to understand the need to include the most sensitive subpopulation in the risk assessment, the children of nearby

residents. As previously stated to U.S. DOE, it is unacceptable to separate the child exposure and the nearby resident exposure. This ignores the likelihood that the children of nearby residents will find nearby plant locations attractive to play, like Paddys Run. Children with a target age of 6-12 years, an exposure frequency of 3 times a week in summer months and once a week in spring and fall, and an ingestion rate of 100 mg per day (given normal mouthing habits) must be used. Of course, U.S. DOE may be more conservative. This exposure scenario is in addition to the children;s lifetime exposure to direct radiation and airborne radon/radon-daughters. Eventhough these risks are minimal in the OU#4 risk assessment, they must be included for completeness and to insure consistency when the combined risk assessment is prepared for the site (OU#5).

14. U.S. DOE's response labelled as No.4 is not adequate to address U.S. EPA's comment. Sample data from cows would be a more desirable piece of information to evaluate exposure, uptake, and biological response for human and nonhuman receptors to K-65 waste materials (including radon and its daughter products). The examination of body fluid analysis in addition to milk should be considered. On any given date cows can be grazing and consuming water from the Paddys Run area. It is reasonable to assume that they ingest a considerable amount of sediment. The sediments in Paddy's Run have been calculated to contain 9.6 and 10.7 pCi/g of total uranium and Ra-226, respectively (Table E3-2). Therefore, U.S. DOE is incorrect to assume that there is no risk from consumption of meat or milk. Eventhough this pathway may present a low risk, it must be included in the risk assessment. The risk calculation process is additive and the inclusion of a number of exposures, even at the 10E-6 level, can be important to identify all pathways of exposure so that these can be addressed in the appropriate manner to reduce the risk to residents of the area. Children drink a lot of milk and consume locally grown vegetables, so these exposures must be included.

15. U.S. DOE's response to comment #6: U.S. DOE is incorrect in stating that refinements of data is not necessary as they will not alter the conclusions that the human health risks are unacceptable. Risk characterization is an attempt to fully characterize all the risks. If the best data is not used, correct risk coefficients are not applied, or all exposure pathways are not included in the risk assessment, the characterization of the risks cannot be considered to be acceptable or adequate.

16. U.S. DOE's response to comment #6D: It is important to determine is excursions exist, either with time of day or season. Such information enables the implementation of

reasonable protective action. All air monitoring analyses must incorporate the three significant parameters used in the United States to define air quality: concentration, averaging time, and frequency of occurrence. These are the minimum criteria needed to determine the type and extent of contaminant releases. The current radon monitoring program is clearly inadequate.

17. U.S. DOE's response to #8: Risks must be described in the context of the exposed population. It is meaningless to tabulate the exposures from the current land use and future land use pathways (Tables E3-4 and E3-5) without identifying the populations to which these exposures/doses apply. In Section E5.1, carcinogenic risks should be tabulated, showing the target populations and the contributions from each pathway. Tables E5.1 and E5.2 (noncarcinogenic effect summaries) must also be similarly modified to show these parameters. These tables are not useful in their current form.

18. U.S. DOE's response to #9: The results of modeling of the deposition of Pb-210 on the ground surface needs to be presented. The time period that was used to determine accumulation on the ground surface would <u>never</u> reach background levels needs to be specified.

19. U.S. DOE's response to #37: In Table E4.1, the "d" listed for the critical effect of beryllium is ambiguous. Is this a footnote? The NG given for vanadium should be footnoted as shown for copper.

20. U.S. DOE's response to #52: Refer to the response to comment #6. The correct risk coefficients must be applied if the risk characterization is to be considered acceptable.

21. U.S. DOE's response to #54: Refer to response to comment #52.

22. U.S. DOE's response to #61: Refer to response to comments #1 and 60.

23. U.S. DOE's response labelled as No.9 is not adequate to address U.S. EPA's comment. Soil samples should be collected at the projected point of exposure. This data would help calibrate and validate the model assumptions for the deposition of radon progeny.

24. U.S. DOE's response labelled as No.15 is not adequate to address U.S. EPA's comment. The risk to the on-site worker performing the actual remediation work which will be included in the risk assessment accompanying the evaluation of the remedial alternatives is appropriate. However, the

risk assessment should also include the on-site worker which is performing routine functions such as administration, maintenance, an operations.

25. U.S. DOE's response labelled as #24 is not adequate to address U.S. EPA's comment. The discussion on the risk characterization presented in the University of Ohio Study must consider EPA's comments on that report. As presented it appears that EPA concurs with the risk characterization even though EPA had significant comment on the study.

26. A statistical analysis of the materials in Silos 1 through 3 indicate that the degree of homogeneity is about the same for all three silos. Therefore, DOE needs to (1) provide additional information to support their conclusion that 30 percent sample recovery is adequate to characterize the silo contents; or (2) conduct additional sampling of the materials in Silo 3.

27. U.S. DOE's response labelled as No.33 is not adequate to address U.S. EPA's comment. Although the response states the text would be revised, no revision was found in the revised report.

28. U.S. DOE's response labelled as No.35 is not adequate to address U.S. EPA's comment. Specific aquifer proper data is required to adequately characterize the migration pathways within this operable unit. This is especially important in the area of the perched water-table aquifer which is reportedly comprised of fill materials and may not have the same characteristics of the actual aquifer materials.

29. U.S. DOE's response labelled as No.36 is not adequate to address U.S. EPA's comment. The location, concentration, and frequency of occurrence is typically used to indicate contaminant source and extant of migration of contaminants not unique to a particular source. Therefore, it appears that additional data analysis could be conducted.

30. U.S. DOE's response labelled as No.36(cont.) is not adequate to address U.S. EPA's comment. Although the inclusion of Pb-210 into the sampling plans of the silo contents, soil embankment, and subsurface soils, it should also be included into future ground-water sampling efforts.

31. U.s. DOE's response labelled as No.38 is not adequate to address U.S. EPA's comment. Unless the data generated from the Westinghouse environmental monitoring program can be shown to be of sufficient quality to meet the RI data quality objectives, it cannot be used to support conclusions and used in the decision making process.

32. U.S. DOE's response labelled as No.44 is not adequate to address U.S. EPA's comment. The radiological screening results recorded on the boring log for location 032 does not indicate the presence of above background levels of radiological parameters. This seems to refute DOE's contention that the uranium contamination in the ground water is from the fill material in the area of the well screen. Analysis of archived soil samples form the boring would help identify the presence or absence of uranium in the materials near the well screen.

33. U.S. DOE's response labelled as No.44 (cont.) is not adequate to address EPA's comment. The response discusses U-238 in soil samples when the comment refers to ground-water. In addition, the text of the RI was revised to indicate that the waste pit area may be a possible source of the uranium contamination in the ground water down gradient of the Silos. The identification of the waste pits as a potential source of the uranium contamination is misleading because (1) the waste pits are not up gradient of the silos; (2) wells between the waste pits and well 1032 do not indicate that uranium contaminated ground water is migrating from the waste pit area to well 1032.

34. U.S. DOE's response labelled as No.44 (cont.) is not adequate to address U.S. EPA's comment. The identification of deicing materials as the source of the elevated sodium, chloride, calcium, and sulfate is misleading. Ground-water samples from other wells very close to the same road do not show elevated levels of these constituents.

35. U.S. DOE's response labelled as No.51 is not adequate to address U.S. EPA's comment. Ground-water samples should be collected and analyzed as soon as possible. The berm and slant boring projects may not be completed until spring. This delay in sampling ground-water until after the berm and slant boring sampling is completed is not justified.

36. U.S. DOE's response labelled as No.52 and 54 is not adequate to address U.S. EPA's comment. Regardless of the conservative nature of the risk assessment, EPA's value of 4E-04/rem must be used in completing the risk assessment. It should be noted that the most recent ICRP risk coefficient value is 5E-04/rem .

37. U.S. DOE's response labelled as No.55 is not adequate to address U.S. EPA's comment. The model description in Attachment III of Appendix E should include a list of input parameters used in the models.

38. Section 6.1, Page 6-1, Paragraph 2 through 4; Provide a summary table of the Chemicals of Potential Concern which

have been selected for evaluation along with the specific exposure pathway. This will assist in clarifying the discussion in this section.

39. Section 6.2, Page 6-2, Paragraph 2 and 3; Provide a summary table of the complete exposure pathways, both present and future. Include the specific activities which the RMEs perform which enables their exposure (ie., breathing, skin exposure, drinking, passive or active ingestion, outdoor activity, indoor activity).

40. Section 6.2, Page 6-2, Paragraph 3; A mrem value should be stated in addition to the WLM value. There is a conversion factor for this conversion. It would also make it easier to make comparisons between the various pathways.

41. Section 6.2, Page 6-2, Paragraph 3; Specify the detected environmental receptors which may have received contamination. Indicate that the levels found do not exceed the concentrations listed as toxic in the materials reviewed to date. In addition, a search for a more sensitive methodology focusing on environmental receptor exposure indicators at a cellular or sub-cellular level, such as a bioluminescent bacteria test, should be conducted. If such activities are underway already, this should be presented.

42. Section 6.3, Page 6-3, Paragraph 3; The U.S. EPA guideline for risk evaluation is the primary coefficient value to be used for quantifying risk. Any risks presented should reflect the usage of the U.S. EPA's established coefficient value. U.S. DOE may mention that U.S. DOE has a less restrictive coefficient value as an additional reference.

43. Section 6.3, Page 6-4, Paragraph 1; The toxicological discussion should address all constituents that have been identified as having complete exposure pathways under current and future conditions. Not all of the materials identified as being present in the silos and stated as having the potential to migrate under future conditions are presented.

44. Section 6.4, Page 6-4, Paragraph 3; Justify the location chosen for exposure to radiological activity concentrations at (1) the K-65 fence line for the evaluation of future risk and (2) at the FMPC boundary for current exposure. Also, clarify the specific locations.

45. Section E-2.2, Page E-2-25, Paragraph 1; Explain the procedure and/or models used to evaluate the accumulation of

radon progeny in the berm soils. Include a calculated concentration.

46. Section E-2.2, Page E-2-25, Paragraph 2; Clarify the relationship between the diffusion of radon through the domes and the diffusion through the berm soils.

47. Section E-2.2, Page E-2-25, Paragraph 3; Clarify the statement that "simplified modeling" is used by the RAECOM computer code to model the migration of radon into the berm soil.

48. Section E-2.3, Page E-2-30, Paragraph 2; Revise the statement that EPA guidance suggests that identifying the uncertainty variables is more important or is a substitute for doing quantitative uncertainty analysis. This is incorrect and a misrepresentation of the intent of the risk assessment guidance.

39. Section E-3.1.1, Page E-3-15, Paragraph 3; The general equation shown for calculating the dose equivalent should show separate variables for time indoors (sleeping and active) and time outdoors, as well as separate variables for their associated modification factors. Similarly the shielding factor variable should only be shown applied to the time intervals corresponding to indoor activity.

40. Section E-3.2, Page E-3-6, Paragraph 6; The last line which states that inhalation of radon gas is one pathway for exposure should also include radon progeny.

41. Section E-3.3.1.2, Page E-3-16, Paragraph 3; Since Working Level/Working Level Month is used in other parts of this risk assessment and in Chapter 6, this unit should be included in this discussion as well. Explain the relationship between Pci/L and Working Level, as well as any assumptions made.

42. Section E-3.3.1.2, Page E-3-17; The definition for CF under current land use should be 10E-03 mrem/urem.

43. Section E-6.1, Page E-6-2, Paragraph 1; The information presented on uptake of Ra-226 in plants suggests that the uptake by plants at operable unit 4 will be negligible. The point of discussion here, however, is uptake by organisms in Paddy's Run. Clarify your justification for the relationship between the plant uptake information and the bioaccumulation of radiological materials by the living biota in the creek.

44. Section E-6.3, Page E-6-3; There are no actual toxicity test data presented in this section. The review of available

related data is helpful, but inconclusive relative to evaluating environmental risks at FMPC. Toxicity tests (ie. seed germination studies, survivability studies) and bioassays (ie. chromosomal assays, tissue examination) need to be conducted using all site media (soils, sediments, surface water) in contact with plants and animals (both macro and micro fauna) to evaluate their effect on all endemic species. Tissue studies of the local grazing cattle may provide useful information on radionuclide uptake for larger animals as well as humans.

45. Section E-6.3, Page E-6-3, Paragraph 5; It should be pointed out in the discussion that the concentration reported for uranium at ASIT-10 (2219 ug/L) falls within the range of concentration reported to suppress Daphnia reproduction (0.5 to 3.5 mg/L). In addition, all units within a discussion section need to be standardized. The usage of ug/L and mg/L for comparison of values in the same section is misleading.

It is U.S. EPA's position that the revised RI report cannot become final until all of the deficiencies detailed in the December 7, 1990 Notice of Violation, and in Attachment A to this letter have been adequately addressed by U.S. DOE. Accordingly, U.S. EPA hereby invokes dispute resolution as provided under Paragraph B of Section XIV of the 1990 Consent Agreement. U.S. EPA recommends that we commence informal dispute resolution during the meeting scheduled for December 17, 1990.

Sincerely yours,

Catherine A McCord

Catherine A. McCord
Remedial Project Manager

Attachments

cc: Richard Shank, OEPA - CO
Graham Mitchell, OEPA - SWDO
Joe LaGrone, U.S. DOE - ORO
Leo Duffy, U.S. DOE - HDQ

UNITED STATES ENVIRONMENTAL PROTECTION AGENCY
REGION 5
230 SOUTH DEARBORN ST.
CHICAGO, ILLINOIS 60604

2459

DEC 07 1990

REPLY TO ATTENTION OF:

5H-12

Mr. William D. Adams
Acting Assistant Manager
Environmental Restoration and
Waste Management
U.S. Department of Energy
200 Administration Drive
Oak Ridge, Tennessee
37831-8501

Re: Notice of Violation
OU#4 RI/Risk Assessment
U.S. DOE Fernald
OH6 890 008 976

Dear Mr. Adams:

On August 27, 1990, the United States Department of Energy (U.S. DOE) submitted a primary draft Remedial Investigation and Risk Assessment report (the initial RI report) for Operable Unit #4 (Silos 1, 2,3, and 4). The United States Environmental Protection Agency (U.S. EPA) disapproved this report on September 27, 1990. Accordingly, pursuant to Section XII of the 1990 Consent Agreement, U. S. DOE was required to submit a draft final primary RI report (the revised draft RI report) by October 27, 1990. On October 26, 1990, U.S. DOE requested a 20-day extension of time and submitted the revised draft RI report to U.S. EPA on November 7, 1990.

In accordance with Section XII.B of the Consent Agreement, U.S. EPA has reviewed the revised RI report. Based upon this review, U.S. EPA has determined that the report was not developed in accordance with the requirements of the Consent Agreement, the Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA), the National Oil and Hazardous Substances Pollution Contingency Plan (NCP), and applicable U.S. EPA guidance and policy, as required by Section X.C of the 1990 Consent Agreement. Thus, for the reasons set forth below, U.S EPA hereby finds that U.S. DOE is in violation of 1990 Consent Agreement.

Section 104(b) of CERCLA, 42 U.S.C. § 9604(b), provides the general framework for studies and investigations. Pursuant to this provision, the President has authority to conduct investigations, monitoring, surveys, testing, and other information gathering as deemed necessary to identify the existence and extent of the release or threat thereof, the source and nature of the hazardous substances, pollutants or contaminants involved and the extent of danger to the public health or welfare or to the environment.

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Section 300.430 of the NCP, 40 C.F.R. § 300.430, describes in detail the investigatory obligations provided for by Section 104(b) of CERCLA. "The purpose of the remedial investigation (RI) is to collect data necessary to adequately characterize the site for the purpose of developing and evaluating effective remedial alternatives" (40 C.F.R. § 300.430(d)(1)). To meet this objective the NCP requires that the parties "conduct field investigations, including treatability studies, and conduct a baseline risk assessment". More specifically, Section 300.430(d)(2) provides a detailed list of the types of data gathering and investigation appropriate for the RI (40 C.F.R. § 300.430(d)(2)). The NCP makes clear that the information gathered as a result of the RI activities is essential to assess the risks to human health and the environment and to support the development, evaluation, and selection of appropriate response alternatives (40 C.F.R. § 300.430(d)(3)-(4)). This approach is confirmed by U.S. EPA guidance, Conducting Remedial Investigations and Feasibility Studies Under CERCLA (OSWER Directive 9355.3-01).

Contrary to the express language of the NCP, the revised RI report submitted by U.S. DOE lacks the data required to characterize the site or the current and potential risks to human health and the environment. There is not sufficient information to perform a detailed screening of alternatives and to support remedy selection.

U.S. EPA raised the issue of inadequate data in its September 27, 1990 disapproval letter (Attachment 1). In that letter, U.S. EPA stated that based upon the initial RI report, U.S. DOE had failed to collect the field data necessary to support an adequate RI and Risk Assessment report. Although U.S. DOE was required to submit a revised report responding to such comments, the revised RI report submitted by U.S. DOE on November 7, 1990, failed to adequately address this essential omission. To date, U.S. DOE has only completed structural integrity analysis and a portion of the internal tank sampling and the decant tank sampling, thus the associated analytical results are not yet available. Additionally, the following tasks remain to be completed or performed:

- internal residue sampling and analysis for characterization of the materials in the tanks;
- berm sampling and slant borings for characterization of soils, to determine if the tanks are leaking or have leaked;
- adequate characterization of shallow groundwater in the silo area;
- analysis for characterization of contents of the decant tank for characterization; and
- adequate monitoring of emissions and direct radiation.

Without the data collection described above, the revised RI report cannot serve its intended purpose as provided under the NCP. In the transmittal letter for the revised RI report, U.S. DOE acknowledged that the revised RI report fails to include the necessary data (Attachment 2). At U.S. EPA's request, U.S. DOE suggested the following alternatives for dealing with this problem:

- request an extension for sampling completion and characterization of waste and surrounding environment;
- continue with current schedule and incorporate data upon availability; or
- revise the operable unit scheme and divide OU#4 into two operable units.

However, rather than selecting an alternative which complies with the NCP, U.S. DOE chose to proceed with the current schedule and submit primary documents without the RI data. This "option" is inconsistent with the express terms of the 1990 Consent Agreement and threatens the integrity of the RI/FS process as described in the Agreement, CERCLA, the NCP, and applicable U.S. EPA guidance.

U.S. DOE's failure to submit an RI report which complies with the NCP constitutes a violation of the express terms of Section X.C of the Consent Agreement. Given the severity and extent of the violation and the effect of the violation on the implementation of the remedial action, U.S. EPA finds it is appropriate to apply the stipulated penalties provision in Section XVII of the Consent Agreement. Pursuant to Section XVII, U.S. DOE may be assessed stipulated penalties at a rate not to exceed $5,000 for the first week (or part thereof) and $10,000 for each additional week (or part thereof). Stipulated penalties begin to accrue upon receipt of this letter and will continue to accrue until U.S. DOE completes the RI field activities and associated analytical work and submits to U.S. EPA an RI and Risk Assessment report that complies with CERCLA, the NCP, and the 1990 Consent Agreement.

This letter constitutes written notification of violation as required by Section XVII of the Consent Agreement. As provided by the Agreement, U.S. DOE has fifteen days from receipt of this notice to invoke dispute resolution. If you have any questions regarding this matter, please contact Ms. Mary Butler at the Office of Regional Counsel at (312/FTS) 353-8514.

Sincerely yours,

David A. Ullrich

David A. Ullrich, Director
Waste Management Division

Attachments

cc: Richard Shank, OEPA - CO
Graham Mitchell, OEPA - SWDO
Joe LaGrone, U.S. DOE - ORO
Leo Duffy, U.S. DOE - HDQ

bcc: Ralph R. Bauer, ORA
David A. Ullrich, WMD
Bertram C. Frey, ORC
Dale Bryson, WD
Robert Springer, PMD
William H. Sanders, III, ESD
William E. Muno, WMD
Kevin Pierard, WMD
Len Robinson, ORC
Mary Butler, ORC
Sandra Lee, ORC
David Kee, ARD
Dan O'Riordan, OPA
Rose Freeman, ORA
Gordon Davidson, OS-530
Sally Mosely, OS-530
William Duncan, OS-530
Ed Schuessler, PRC

DOE DISK#5:OU#4-RI.nov

UNITED STATES ENVIRONMENTAL PROTECTION AGENCY
REGION 5
230 SOUTH DEARBORN ST.
CHICAGO, ILLINOIS 60604

2459

SEP 27 1990

REPLY TO ATTENTION OF:

5HR-12

Mr. Bobby Davis
United States Department of Energy
Feed Materials Production Center
P.O. Box 398705
Cincinnati, Ohio 45239-8705

Re: OU#4 RI Disapproval
U.S. DOE Fernald
OH6 890 008 976

Dear Mr. Davis:

On August 27, 1990, the United States Department of Energy (U.S. DOE) submitted a Remedial Investigation and Risk Assessment (RI) report for Operable Unit #4 (Silos 1, 2,3, and 4) as required by the 1990 Consent Agreement.

Based on U.S. DOE's failure to collect adequate RI data, the United States Environmental Protection Agency (U.S. EPA) is disapproving the RI report. The following tasks have not been completed:

- internal residue sampling and analysis for characterization of the materials in the tanks;
- berm sampling and slant borings under the silos for characterization of shallow water and soils, in order to determine if the tanks are leaking or have leaked;
- adequate characterization of the groundwater in the silos area;
- sampling and analysis of the decant tank for characterization; and
- adequate monitoring of emissions and direct radiation.

This is the minimum additional information that is required for completion of the RI and to support Feasibility Study (FS) work.

U.S. EPA has the following comments to guide U.S. DOE in preparation of the RI report revision:

GENERAL COMMENTS

1. Generally the RI report addresses all areas required by the national contingency plan; however, several sections are incomplete because all data elements have not been collected.

2. The combination of target populations evaluated in the Risk Assessment does not consider all risk groups. The population identified as the most sensitive population may not be correct. Children have access to Paddys Run and have typical sediment ingestion rates of about 100 mg/day, given normal mouthing habits. This exposure should be in addition to the penetrating radiation and airborne radon/radon daughter exposures, if it is found that this operable unit contributes exposures along this pathway.

3. No data is presented for the evaluation of the risk calculations, either from monitoring or analysis. All data must be included in the report.

4. Cows graze in the area. Results from the testing of milk and meat must be presented from cows grazing in the Paddy's Run area and possibly drinking from it. This information should be included in the "accumulating" Risk Assessment reports for each operable unit.

5. Radon and associated decay products (transported in air and direct radiation) are by far the largest sources of exposure to residents from this operable unit. The amount of data presented in characterization of these sources of exposure is entirely inadequate. Existing data is largely the result of an array of alpha track detectors and thermoluminescent dosimeters (TLDs) along the fence-line of the facility. The alpha track detectors are only able to measure the long-term average of radon-222, not decay products from radon-222 or thoron (radon-220) that may be associated with thorium in the silos. The alpha track detectors are not sensitive enough to accurately discriminate between elevated radon levels and background. TLDs are not adequate to characterize direct radiation fields at fixed locations. Detailed radiation levels at many points on and off-property, including background locations, can be readily obtained using pressurized ion chambers (PICs) located in the vicinity of the silos.

6. Based on estimates made using existing data, risks to residents near or on the site are clearly unacceptable. There are several questions regarding the existing data that need to be answered and may possibly indicate an even higher risk than previously assumed:

   A. What is the degree of equilibrium of radon and its decay products at nearby residences all around the facility? To what degree are radon decay products being emitted from the silos along with radon? The actual dose to residents is influenced by this.

   B. Is thoron emitted from the silos? Are thoron decay products present in the plume? What is the associated exposure/dose? Many of the typical assumptions about insignificance of thoron dose relative to radon dose may not be valid at the site.

   C. What are the temporal patterns of radon exposure? What the the seasonal patterns? This may effect dose significantly, due to temporal and seasonal variations in home occupancy and would best

be measured using continuous monitors, rather than passive integrating devices.

D. How is the level of radon within the living areas of nearby residents in all directions affected by the silos?

E. What is the actual background levels for radon? Continuous monitoring should be used to make this determination because the emissions are not continuous. As previously stated, alpha track devices are not the most sensitive monitoring devices available.

7. Information on the degree of equilibrium, thoron dose, and distribution of radon exposures needs to be addressed.

8. The risks should also be presented by sensitive populations, not just by pathways/media. A better approach may be to determine a set of sensitive sub-populations for each operable unit. When sub-populations do not receive exposures from a particular operable unit, they can be deleted (with an explanation) from the analysis for a particular operable unit. This would allow for a concise and uniform evaluation of health risk in the final RI report.

9. The nearby resident population is exposed to airborne radon and radon daughters, and it could be expected that radon daughters are deposited in the soil. Soil ingestion (both child and adult) should be included as a pathway.

10. Why are the background risks from penetrating radiation and airborne radon so high? The location of background samples needs to be specified in the Risk Assessment report. Are all the "background" samples elevated? How do these values compare with measurements made in other rural Ohio areas?

SPECIFIC COMMENTS

11. Section ES, Page ES-2, Paragraph 2: The remedial investigation (RI) for Operable Unit 4 (OU4) also should include the underlying soils and ground water to determine the extent the silos are potentially contaminating the environmental media.

12. Section ES, Page ES-3, Paragraph 6: The value of 657 picocuries per gram (pCI/gm) may be an outlier and not representative of the K-65 residues. This should be explained in the text.

13. Section ES, Page ES-9: A third bullet should be added. "Refine radon monitoring network to accurately quantify risks and success of removal actions".

14. Section 1.1, Page 1-7, Paragraph 2: Silo 4 should be included in the remedial investigation/feasibility study (RI/FS) process, even if a no-action remedial action alternative is possibility of this silo. There is liquid in this silo.

15. Section 1.1, Page 1-16, Paragraph 1: The issues related to OU4 element 6 (Regional Environment) are also appropriate to be investigated as part of element 5 (OU4 Study Area); these include radon emissions, long term migration potential of materials released from the silos, and nearby environmental resources that could be impacted (e.g. ambient air, ground water, surface water and soils).

    The issue of worker safety was not addressed in the risk assessment. The risk calculations were based on receptors being exposed at the fence line of the FMPC boundary. An additional exposure scenario, on-site worker, needs to be added to the risk assessment.

16. Section 1.3.1, Page 1-25: The text describes the silo's designed structure. The RI report should describe the silo's current state and state that recent studies have shown major degradation in both the silo wall and dome structural stability and thickness.

17. Section 1.3.2, Page 1-44, Paragraph 2: If actual dose levels from field monitoring are available, it would be appropriate to present them in this section.

18. Section 1.3.2, Page 1-44, Paragraph 3: EPA previously had significant comments concerning the risks reported in the University of Cincinnati Risk Assessment Report; these should be addressed and incorporated into this RI report.

19. Section 1.3.2, Page 1-45, Paragraph 4: Additional information concerning the number of samples, type of analyses, and sample location should be presented.

20. Section 1.3.2, Page 1-46, Paragraph 1: The purpose of this portion of the RI report is to present results of previous investigations; therefore, the results of the vadose zone modeling should be presented.

21. Section 1.3.2, Page 1-46, Paragraph 2: The RI report states that the Monsanto-Mound study recommended additional radon monitoring should be conducted. If additional monitoring was conducted, the results of the additional monitoring should be presented.

22. Section 1.3.2, Page 1-46, Paragraph 2: Data from the Monsanto-Mound report is presented for radon concentrations near the silos; the actual distance from the silo plus radon concentrations from more remote monitoring locations should be included.

23. Section 1.3.2, Page 1-47, Paragraph 3: The RI report states data from the FMPC Environmental Monitoring Program is used "when possible". It

would be appropriate to present a summary of this information in this section of the RI report.

24. Section 1.3.2 "Previous Operable Unit 4 Investigations": This section provides only a brief description of the previous, ongoing, and some future investigations of OU4. Little information regarding the data generated from the previous investigations is presented. This section of the RI report should discuss the objectives of previous investigations, location and number of samples, validity of the data, conclusions drawn from the data, and the comparability of the data from previous investigations to the ongoing RI.

25. Section 2.1, Page 2-1, Paragraph 3: It is more important to report the average recovery length of each case, not the average penetration length.

26. Section 2.1, Page 2-1, Paragraph 4: The quality assurance criteria for completeness is typically given for both the number of samples collected (field completeness) and the number of valid analyses (laboratory completeness). The quality assurance project plan (QAPP) for this site specified only laboratory completeness (90 percent). Sampling completeness is defined as the number of samples actually collected compared to the number of samples planned to characterize the waste material. Typically both field and laboratory completeness is set at 90 percent. The RI report needs to justify why a 30 percent field completeness is adequate to characterize the waste material in Silo 3.

    Additionally, 30 percent sample recovery may indicate that there is significant variation in the waste material preventing near complete sample recovery.

27. Section 2.1.3, Page 2-3: The analytical parameters and number of samples has not been agreed upon between U.S. EPA and U.S. DOE. The revised draft RI report should reflect the resolution of these discussions.

28. Section 2.2, Page 2-5, Paragraph 2: The location, number, and collection methods of the 1983 slant borings needs to be presented to fully evaluate the data presented in Section 4.0.

29. Section 2.2.2, Page 2-6: EPA comments on the low angle boring sampling program need to be incorporated into the revised draft RI report.

30. Section 2.4.2, Page 2-12, Paragraph 3: Information describing the samples collected during the Weston Characterization Investigation Study (CIS) should be presented. This information should include the sample collection methods, location, and number of samples.

31. Section 2.3.2, Page 2-11, Paragraph 3: The last sentence of this paragraph contradicts the statements in Section 2.4.2. Section 2.4.2 states "the criteria for selecting areas of surface soil samples were

those areas that indicated radioactive contamination exceeding 35 pCi/g."

32. Section 3.0, Page 3-1, Paragraph 2: The RI report is indented to be a "stand alone" document, therefore it is appropriate to summarize information from other reports. However, it is not appropriate to only reference the other documents to present information.

33. Section 3.3, Page 3-4: This section should provide a discussion on surface water hydrology specific to the OU4 area.

34. Section 3.4.3, Page 3-16, Paragraph 2: The conclusion of limited hydraulic connection needs to be documented with graphs or charts. Data in the appendix to the RI report shows that ground-water elevations in wells screened in the till fluctuate sympathetically (with the exception of well 1029). This indicates there is good hydraulic communication within the perched aquifer in the OU4 area.

35. Section 3.4.3, Page 3-16: Neither well 1048 or 1079 is in the area defined as OU4. Hydraulic conductivities for the hydrogeologic units in the OU4 area should be provided.

36. Section 4.0, Page 4-5, Paragraph 2: The RI report should list other wastes which are unique to the K-65 or metal oxide silos. In addition, the review (or discussion) of the data should not be limited to waste constituents unique to the K-65 or metal oxide silos. The location, concentration, and frequency of occurrence of waste constituents not unique to the K-65 or metal oxide silos can also indicate if contamination is originating from the silos.

    Ground water was not analyzed for lead 210; therefore, the use of lead-210 as an indicator parameter is questionable.

37. Section 4.1.1, Page 4-11, Table 4-1: What does "d" under beryllium and NG under various chemicals stand for? An explanation must be included in key.

38. Section 4.1.1, Page 4-11, Paragraph 2: The RI report needs to document how background concentrations were established for all media.

39. Section 4.1.2, Page 4-16, Paragraph 2: The RI report should state that holding times for volatile organic analyses were exceeded by over 3 months. Furthermore, conclusions concerning the absence of hazardous substance list (HSL) volatile organic compounds should not be made until valid data is available.

40. Section 4.1.2, Page 4-17, Table 4-6: One sample collected from the k-65 silos has an E.P Toxicity concentration for selenium of 1.08 mg/L which also exceeds the maximum acceptable concentration.

41. Section 4.2, Page 4-21, Paragraph 1: The location of the National Lead

of Ohio (NLO) subsoils samples needs to be provided to determine the usefulness of the data presented.

42. Section 4.4.1, Page 4-24, Paragraph 3: The location of each CIS sample needs to be shown on a figure to evaluate the usefulness of the data presented.

43. Section 4.4.1, Page 4-24, Paragraph 5: The data in Table 4-9 shows the concentration of the two radiological indicator parameters (uranium-283 and radium-226) is highest adjacent to silos 1 and 2. This suggests that the data is not as inconclusive as the RI report states. The report should also propose additional work to characterize the nature and extent of near surface radiological contamination.

44. Section 4.7.3, Page 4-47, Paragraph 2: The conclusions in this section are not supported by the data. The text should be revised to acknowledge the following:

> The boring log for well 1032 does not indicate that unnatural debris is present at 7.5 to 9.5 feet below the land surface (screened interval of well 1032).
>
> Uranium-238 (indicator compound for K-65 silos 1 and 2) is present in well 1032 (immediately down gradient of the K-65 silos) at a concentration approximate 20 times higher than well 1033 (immediately up gradient of the K-65 silos).
>
> Four principle inorganic constituents are of K-65 silos are chloride, sulfate, calcium and sodium. These are present in the down gradient well at concentrations greater than the up gradient well. Specifically, chloride 36-, sulfate 3-, calcium 4, and sodium 6 times greater in the down gradient well than the up gradient well.

45. Section 4.7.3, Page 4-48, Paragraph 1: The report should also state that direct vertical percolation of contaminated ground water can also impact the water quality in the Great Miami Aquifer.

46. Section 4.7.3, Page 4-48, Paragraph 2: Well 2034 should also be listed as having above background levels of uranium.

47. Section 4.7.3, Page 4-49, Paragraph 1: While the uranium concentrations in the ground water are close to typical background concentrations, the RI report should clearly state these are above background and indicate contamination.

48. Section 5.0, Page 5-1, Paragraph 2: While most radionuclides generally present a greater hazard than their toxic characteristics, this is not true for uranium.

49. Section 5.2, Page 5-3, Paragraph 1: The statement that "at the time of their design, the K-65 silos did not need to be airtight" should be explained, since the radon concerns have long been known.

50. Section 5.2, Page 5-4, Paragraph 5: The catastrophic failure dose, as estimated by UC, is significantly lower than the dose from continued chronic emissions and should be presented as such.

51. Section 5.4, Page 5-6, Paragraph 4: The RI report states lead-210 is a good indicator compound, yet the ground water was not analyzed for lead-210.

52. Section 6.3, Page 6-3, Paragraph 1: U.S. EPA uses a risk coefficient of 4E-4/rem for low linear energy transfer (LET) radiation, not the 1.25E-4/rem, which is used in the report. Risks that are estimated here for external exposure are thus lower by a factor of 3.

53. Section 6.4, Page 6-4, Paragraph 3: The risk associated with exposure to background levels of radiation should be better documented.

54. Section 6.4, Page 6-4: As a result of using the U.S. EPA risk factor cited above, the combined risk of 6E-3 for present use, combined lifetime risk of 8.5 E-2 for potential future use, are 13% and 70% higher, respectively.

55. Section 6.4, Page 6-5, Paragraph 3: The "unacceptable" levels of the chemical toxicants detected in the ground water should be quantitatively presented.

56. Section 6.4, Page 6-5, Paragraph 3: Even using the lower NCRP risk factors, the conclusion that present and potential future risk increments is the same order of magnitude as background risks is incorrect. Incremental risks exceed background risks by nearly a factor of 10. When using the U.S. EPA factor cited above, the discrepancy is even greater.

57. Section 7.1, Page 7-1, Paragraph 1: At the present time there is insufficient data to support the conclusion that the feasibility study should address only the silo contents and physical structure. At this time it is appropriate to consider all areas of contamination including soil and ground water in the feasibility study, even if contamination has not migrated off-site.

58. Section 7.1, Page 7-1, Paragraph 3: The report needs to clarify why 30% sample recovery for silo 3 is considered successful.

59. Section 7.1, Page 7-1, Paragraph 4: The conclusions concerning the presence or absence of HSL organics is not supported. Holding times for volatile organic compounds were exceeded by over 3 months.

60. Section Appendix E - Executive Summary, Page Exiii, Paragraph 5: "Assuming that a single individual could reasonably be exposed to the

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current estimated above-background RME from both penetrating radiation and airborne radon, the combined lifetime risk from lifetime exposure to these two pathways is 5.3 x 10^{-3}." The risk to a child from ingestion of contaminated soils should also be included in this total risk. The child will be potentially be exposed to airborne radon and penetrating radiation, in addition to the ingestion.

61. Section Appendix E - 5.1.1.5, Page E5-3: As stated previously, a child will also be exposed to airborne radon and penetrating radiation in addition to ingestion of sediments. It would be reasonable to include all pathways in the total risk calculation.

This is the first RI report developed for Fernald. Many comments may be applicable for other operable units.

U.S. DOE must address the above deficiencies and comments in a revision that is to be submitted within thirty (30) days of the date of this letter. U.S. DOE must include adequate data in the revision. If this information can not be provided in the time-frame required by the 1990 Consent Agreement, U.S. DOE must look at other alternatives. The purpose of the dispute resolutions process provided for in the 1990 Consent Agreement is to settle technical disputes and must not be used as a mechanism for obtaining more time for performance of required RI work and obtaining key data elements.

If there are any questions, I may be reached at (312/FTS) 886-4436.

Sincerely,

Catherine A. McCord

Catherine A. McCord
Remedial Project Manager

cc: Richard Shank, OEPA
Graham Mitchell, OEPA
Joe LaGrone, U.S. DOE - ORO
Leo Duffy, U.S. DOE - HDQ